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EXAMINER				
MEJIA, ANTHONY				
ART UNIT		PAPER NUMBER		
2151				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/720,300

Applicant(s)

GUPTA ET AL.

Examiner

ANTHONY MEJIA

Art Unit

2151

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 14 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-17, and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This communication is in response to Application No. 10/720,300 filed nationally on 11 November 2003. The amendment presented on 14 January 2008, which provides change to claims 1-21, is hereby acknowledged. Claims 1, 3-17, 19-21 have been examined.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 5, 6, 7, 17, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang (US 6,738,811) in further view of Chirashnya et al. (US. 2002/0019870) (referred herein after as Chirashnya)

Regarding Claim 1, Liang teaches a method of predicting (col. 2, lines 33-35) the occurrence of critical events in a computer cluster having a series of nodes (computing device, col. 2, lines 1-2), said method comprising:

maintaining an event log (historic data, col. 2, lines 21-33) that contains information concerning critical events that have occurred in the computer cluster (e.g. critical event when a parameter is off a predefined range, col. 6, lines 37-41).

Liang does not explicitly teach loading the information from the event log and the system parameter log into a Bayesian network model representing the computer cluster and its nodes; and using the Bayesian network model to predict a future performance of a node in the cluster based upon a hybrid protection system comprising rule based prediction criteria and time-dependent variable prediction criteria.

However, Chirashnya in a similar field of endeavor discloses a proactive on-line diagnostics in a manageable network including the steps of loading the information from the event log and the system parameter log into a Bayesian network model representing the computer cluster and its nodes (par [0052] , par [0060] and *see* fig.2); and

using the Bayesian network model to predict a future performance of a node in the cluster based upon a hybrid protection system comprising rule based prediction criteria and time-dependent variable (malfunction/faults) prediction criteria (par [0004], [0061] and [0062]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to utilize the teachings of Chirashnya in Liang, to help create models for predicting and controlling future system performance and critical events. One of the ordinary skill in the art would have been motivated to utilize the teachings of both Liang and Chirashnya to facilitate a reliable collaboration for future events that could occur on a system.

Regarding Claim 3, Liang discloses wherein maintaining said system parameter log comprises recording a temperature of a node in the cluster and a corresponding

time value (Fig. 6, & col. 8, lines 13-20).

Regarding Claim 5, the combined teachings of Liang and Chirashnya teach the method of claim 1 as described above. The combined teachings of Liang and Chirashnya further teach the steps of

aligning the events (Liang: col.8, lines 21-30, see fig.6);

categorizing (classifying) the events according to time-dependency (Liang: col.8, lines 21-30, and see fig.5 step 504); and

filtering said event log and said system parameter log such that some critical event information and some system parameter information is eliminated (Chirashnya: e.g., data is subsequently updated in real-time to reflect any changes that occur (Chirashnya: e.g., removal of nodes, and their information)) to reduce storage requirements of the cluster (e.g., it is an inherent property that by eliminating the requirement to store all information, that the storage requirement of the cluster will be reduced, (Chirashnya: par [0051])).

Regarding Claim 6, the combined teachings of Liang and Chirashnya teach the method of claim 1 as described above. The combined teachings of Liang and Chirashnya further teach the step of using a time-series mathematical model (e.g. probability distribution over time function) to predict future values of said system parameters (Chirashnya: [0009 & 0012]).

Regarding Claim 7, the combined teachings of Liang and Chirashnya teach the method of claim 1 as described above. The combined teachings of Liang and Chirashnya further teach wherein comprising using a rule based classification system to predict future critical events based upon said critical event information and said system parameter information (Liang: col. 8, lines 21-22, lines 33-35, col. 8, lines 1-13, Fig. 5, elements 504 & 510).

Regarding Claim 17, the combined teachings of Liang/Chirashnya teach an information processing system comprising:

- a computer cluster having a series of nodes (Liang: computing device, col.2, lines 1-2);

- a control system for monitoring critical events that occur in said computer cluster and system parameter of said nodes (Liang: col.6, lines 37-41);

- a filter mechanism for aligning, categorizing (Liang: col.8, lines 21-30, see fig.5 step 504, and fig.6) and eliminating event information (Chirashnya: par [0050] and [0051]);

- a memory (storage) for storing information related to said occurrence of said critical events and said system parameters of said nodes (Liang: col.6, lines 16-41, fig.3, 206); and

- a Bayesian Network model for predicting a future occurrence of a critical event based upon an observed relationship between said system parameters and said occurrence of critical events (Chirashnya: [0009 and 0012]).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liang in view of Chirashnya, and yet in further view of Odhner (US 6,862,623) (referred herein after as Odhner)

Regarding Claim 4, the combined teachings of Liang and Chirashnya teach the method of claim 1 as described above. Although the combined teachings of Liang and Chirashnya suggest that it would be evident to those of ordinary skill in the art to maintain other parameters (Liang: col.5, lines 24-30), the combined teachings of Liang and Chirashnya does not explicitly disclose wherein maintaining said system parameter log comprises recording particularly a utilization parameter of a central processing unit of a node in the cluster and a corresponding time value.

Odhner, in a similar field of endeavor such as capacity planning, discloses recording a utilization parameter of a central processing unit of a node in the cluster (e.g., screenshot of processor utilization, see fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to utilize the teachings of Odhner in Liang/Chirashnya to help manage redundancy in the system. One of the ordinary skill in the art would have been motivated to utilize the teachings of both Liang/Chirashnya and Odhner to have a redundancy controlled system to help manage the different conditions of the system.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liang in view of Chirashnya and yet in further view of Castelli et al. (US. 2003/0023719) (referred herein after as Castelli).

Regarding Claim 8, the combined teachings of Liang and Chirashnya teach the method of claim 1 as described above. The combined teachings of Liang and Chirashnya further teach the step of predicting comprises forming a warning window (e.g., notification is sent to the owner of a particular registered server) only for each node in the cluster in which at least one error (e.g., abnormal condition) has occurred (Liang: col.8, lines 31-35, and *see* fig. 5) in order to reduce system requirements (e.g., it is an inherent property that by only forming a window for each node that an error has occurred on, it will reduce system requirements since less resources are being used).

The combined teachings of Liang and Chirashnya do not explicitly teach the step wherein said warning window comprises a predicted performance parameter or critical occurrence for the node for a predetermined future period of time.

However, Castelli in a similar field of endeavor such as prediction of computer system or network performance, teaches the step of wherein said warning window comprises a predicted performance parameter (e.g., prediction is displayed [0045 & 0055-0056], and 107 of fig. 1) or critical occurrence for the node for a predetermined future period of time.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to utilize the teachings of Castelli in Liang/Chirashnya, in order to be able to collect data for a future period of time, and not be limited only to present and

historic data. One of the ordinary skill in the art would have been motivated to combine the teachings of both Liang/Chirashnya and Castelli, to allow the user of the system to be able to be able to analyze a predicted performance parameter or critical event occurrence on the system.

5. Claims 9-16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liang in view of Chirashnya in further view of Harrop (US. 7,225,250) (referred herein after as Harrop).

Regarding Claim 9, Liang discloses a method of improving the performance of a computer cluster having a series of nodes, said method comprising the steps of: monitoring the occurrence of critical events (e.g., parameters are off a predefined range) in said nodes in said computer cluster (Liang: col.6, lines 37-41);

monitoring system performance parameters of said nodes in said computer cluster (Liang: server 114 of fig. 1A & col.4, lines 37-41, col.5, lines 20-30).

Liang does not explicitly teach the steps of creating a node representation for each node in said computer cluster based upon said monitoring; nor creating a cluster representation based on said node representations; nor periodically examining said node representations to predict future node performance.

However, Chirashnya in a similar endeavor discloses a proactive on-line diagnostics to improve computer cluster performance, including the steps of:

creating a node representation for each node in said computer cluster (e.g., system model that updates the configuration database which describes the modules that are used in the network) based upon said monitoring (e.g., complete configuration is updated in configuration database automatically in real time, based on which modules are available, their status, and topology to reflect any changes that occur with each of the nodes in the network, Chirashnya: [0051], and element 44 of fig. 2);

creating a cluster representation (e.g., Bayesian Network, element 70 of fig. 4) based on said node representations constructs (e.g. a diagnostic engine constructs (fig.2, 48) a cluster representation, in response to an observed critical occurrence (e.g., unsolicited data as indicated by an alarm (element 71 of fig. 4);

creating (building) the cluster representation, the diagnostic engine, begins with the nodes corresponding to the observed alarm, and the fault that caused the alarm, Chirashnya: [0065-0068]);

periodically (whenever an alarm or sequence of alarms is received from the network, Chirashnya: [0010]) examining said node representations to predict future node performance (e.g., Bayesian Network that updates and predicts the probability of failure of a given device on a network, Chirashnya: [0009]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to utilize the teachings of Chirashnya in the method of Liang, to allow the users of the system to automatically identify the most probable system

malfunctions that would occur on a network and to proactively maintain system reliability.

In further, the combined teachings of Liang and Chirashnya do not explicitly teach using said cluster representation to redistribute tasks among said nodes based upon said predicted node performance.

However, Harrop in a similar field of endeavor, discloses a method of resource management in a network, comprising in the steps of predicting whether a performance problem within a network or network element is likely to occur (col.14, lines 61- 67, col.15, lines 1-8) and where a responsive action is to be taken in response to a predicted failure is to reallocate tasks to other resources available on the network (col.15, lines 47-51, 65-51 and col.16, lines 1-5).

It would have been obvious to one of the ordinary skill in the art at the time the invention was made to utilize the teachings of Harrop in Liang/Chirashnya in reallocating the tasks on a system to help optimize redundancy. One of ordinary skill in the art at the time the invention was made would have been motivated in being able to have a proactive solution to possible future malfunctions that could occur in the network by reallocating tasks accordingly to the resources that are available on the network.

Regarding Claim 10, wherein creating said cluster representation comprises creating a Bayesian Network that represents relationships between the occurrence of said critical events and said system performance parameters (Chirashnya: par [0052] , [0061], and see fig.1 and 2)

Regarding Claim 11, saving information concerning said critical events and said system performance parameters in a database (Liang: col. 2, line 21).

Regarding Claim 12, filtering said saved information to remove information wherein said removed information is not determined to be useful in predicting a future performance of said nodes (Chirashnya: [0051]).

Regarding Claim 13, applying a time-series mathematical model (e.g. probability distribution over time function) to said system performance parameters to predict future values of said system performance parameters (Chirashnya: [0009, 0012 & 0026]).

Regarding Claim 14, wherein said time series mathematical model is a moving average (mean) (Chirashnya: [0054]).

Regarding Claim 15, using rule based classifications to associate some system performance parameters with occurrence of said critical events (Liang: col. 8, lines 21-35, col. 6, lines 27-30, elements 504 & 510 of Fig. 5)

Regarding Claim 16, wherein said system performance parameters concern at least one of a node temperature (Liang: element 402 of fig. 6, & col. 6, lines 43-48, & 59-61).

Regarding Claim 19, wherein said Bayesian Network comprises a time-series modeler for predicting future values of said system parameters (Chirashnya: using a time-series mathematical model (e.g. probability distribution over time function) to predict future values of said system parameters (Chirashnya: [0009 & 0012]).

Regarding Claim 20, wherein said Bayesian Network comprises a rule based classification system for associating said parameter with said occurrences of said critical events (Liang: col. 8, lines 21-35, col. 6, lines 27-30, elements 504 & 510 of Fig. 5).

Regarding Claim 21, the combined teachings of Liang/Chirashnya discloses wherein comprising a dynamic probe generator (monitoring module) for determining when it is necessary (how often) to collect additional information concerning said system parameters or said critical event occurrence (Liang: col.6, lines 24-30); and

probing the system for the additional information (Liang: e.g., data can be analyzed separately, thus data maybe analyzed at one given point, and additional data maybe probed at a later point to be analyzed, col.7, lines 13-19).

Response to Arguments

6. Applicant's arguments filed 14 January 2008 have been fully considered but are deemed moot in view of the following new grounds of rejection as explained here below, necessitated by Applicant's substantial amendments (i.e., amendment of claim 1, *"loading the information from the event log and the system parameter log into a Bayesian network model..."* and *"...upon a hybrid prediction system comprising rule based prediction..."*) to the claims which significantly affected the scope thereof.

A) As to claim 1, Applicant alleges that Claim 1 as amended is not anticipated by Liang because Liang does not teach or suggest the use of a Bayesian network model to predict future events.

As to the above point A), the Examiner agrees in that Claim 1 as amended is not anticipated by Liang because Liang is silent in teaching the use of a Bayesian network model to predict future events. However, Chirashnya in a similar field of endeavor discloses a proactive on-line diagnostics in a manageable network, clearly teaches using a Bayesian network model to predict future events. The Bayesian Network model constructed by Chirashnya includes possible malfunctions and triggers to malfunctions (par [0004], [0061], [0062], and see fig.4 and fig.6-8). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to utilize the teachings of Chirashnya in Liang, to help create models for predicting and controlling future system performance and critical events. One of the ordinary skill in the

art would have been motivated to utilize the teachings of both Liang and Chirashnya to facilitate a reliable collaboration for future events that could occur on a system.

B) As to claim 5, Applicant argues that Chirashnya's diagnostic unit does *not* filter event information such that some information is eliminated to reduce storage requirements.

As to the above point B), the Examiner respectfully disagrees in that Chirashnya's diagnostic filter *does* filter event information. Chirashnya clearly teaches filtering event information by subsequently updating data in the configuration database in real-time to reflect any changes that occur with the nodes including removing the data for nodes that have been removed from the system. It is an inherent property to one of ordinary skill in the art at the time the invention was made that by eliminating the requirement to store all information in the database, that the storage requirement of the cluster will be reduced, *see par [0051]*.

C) As to claim 17, Applicant alleges that Claim 17 as amended is not unpatentable over Liang in view of Chirashnya because the combination of the two does not teach or suggest the use of a filter mechanism for aligning, categorizing, and eliminating event information.

As to the above point C), the Examiner respectfully disagrees with the Applicant in that the combination of Liang and Chirashnya does not teach or suggest the use of a filter mechanism for aligning, categorizing, and eliminating event information. Liang

clearly teaches a filter mechanism for aligning and categorizing event information (col. 8, lines 21-30, see fig.5 step, 504 and fig.6). In further, the applicant defines in par [0018] of the Applicant's disclosure that the filter mechanism eliminates event information by determining what information needs to be logged as relevant and what information may be discarded as irrelevant. Chirashnya clearly teaches eliminating event information by subsequently updating data in the configuration database in real-time to reflect any changes that occur with the nodes such as removing data information which is considered to be irrelevant to one of ordinary skill in the art at the time the invention was made since the nodes that have been removed from the system (par [0051-0052]).

D) As to claim 21, Applicant alleges that Claim 21 as amended, the combination of Liang and Chirashnya does not teach or suggest the step of "determining when it necessary to collect additional information concerning said system parameters or said critical event occurrence; and probing the system for additional information".

As to the above point D), the Examiner respectfully disagrees with the Applicant in that the combination of Liang and Chirashnya does teach or suggest the step of determining when it necessary to collect additional information concerning said system parameters or said critical event occurrence (Liang: col.6, lines 24-30); and probing the system for additional information (Liang: col.7, lines 13-19). Liang suggests that the system is able to be configured on how often a node shall be monitored, how the status of the nodes shall be reported, and what measures shall be provided to determine if the

node is in a critical condition. In further, Liang suggests that the data can be analyzed separately, thus data maybe analyzed at one given point, and additional data maybe probed at a later point to be analyzed.

E) As to Claim 8, Applicant alleges that Claim 8 as amended, the applied references, in particular Laing and Castelli, do not teach or suggest the step of forming a "warning window for *only* each node in the cluster in *which at least one server has occurred in order to reduce system requirements*, and for each node, the window displays the predicted performance parameter for a predetermined future period of time".

As to the above point E), the Examiner respectfully disagrees in that the combination of Liang/Chirashnya/Castelli do teach or suggest the step of forming a "warning window for *only* each node in the cluster in *which at least one server has occurred in order to reduce system requirements*, and for each node, the window displays the predicted performance parameter for a predetermined future period of time. Liang suggests that a notification is sent to the owner of a particular registered server in the cluster in which at least one abnormal condition has occurred (Liang: col.8, lines 31-35, and see fig. 5). It is an inherent property that by only forming a window for each node that an error has occurred on, it will reduce system requirements since fewer resources are being used.

F) As to Claim 9, Applicant alleges that Claim 9 is not rendered unpatentable by the cited references (i.e., Liang/Chirashnya/Harrop) because none of the applied references teach or suggest the step of “using said cluster representation to redistribute tasks among said nodes based upon said predicted node performance”, in particular the Harrop reference.

As to the above point F), the Examiner respectfully disagrees in that the combination of Liang/Chirashnya/Harrop does teach or suggest the step of “using said cluster representation to redistribute tasks among said nodes based upon said predicted node performance”. Harrop teaches an intelligent strategically way of predicting a performance problem that is likely to occur in the future by monitoring and performing statistical analysis on a mathematical representation (e.g., Bayesian network model) that is created, and by implementing rules that may define particular actions in response to one of these predicted performance problems by attempting to reallocate tasks to other resources on the system (col.14, lines 61- 67, col.15, lines 1-8, and col.15, lines 47-51).

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY MEJIA whose telephone number is (571)270-3630. The examiner can normally be reached on Mon-Thur 9:30AM-8:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on 571-272-3964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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Anthony Mejia
Patent Examiner

/Salad Abdullahi/

Primary Examiner, Art Unit 2157